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ABSTRACT

This paper briefly describes the WebNize system and how it applies a Metro Map metaphor for organizing guided tours in Web based resources. Then, experiences in using the Metro Map based tours in a Knowledge Sharing project at the library at Aarhus School of Business (ASB) in Denmark, are discussed. The Library has been involved in establishing a Learning Resource Center (LRC). The LRC serves as an exploratorium for the development and the testing of new forms of communication and learning, at the same time as it integrates the information resources of the electronic research library. The objective is to create models for Intelligent Knowledge Solutions that can contribute to form the learning environments of the School in the 21st century. The WebNize system is used for sharing of knowledge through metro maps for specific subject areas made available in the Learning Resource Centre at ASB. The metro maps now serve as the entrance to learning resources for several hundred students. (Contains 14 references and 5 figures.) (Author)

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Using a Metro Map Metaphor for organizing Web-based learning resources

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Abstract: This paper briefly describes the WebNize system and how it applies a Metro Map metaphor for organizing guided tours in Web based resources. Then experiences in using the Metro Map based tours in a Knowledge Sharing project at the library at Aarhus School of Business (ASB) in Denmark, is discussed. The Library has been involved in establishing a Learning Resource Centre (LRC). The LRC serves as an exploratorium for the development and the testing of new forms of communication and learning, at the same time as it integrates the information resources of the electronic research library. It is the objective to create models for Intelligent Knowledge Solutions that can contribute to form the learning environments of the School in the 21st century. The WebNize system is used for sharing of knowledge through metro maps for specific subject areas made available in the Learning Resource Centre at ASB. The metro maps now serve as the entrance to learning resources for several hundred students.

1. Introduction

Support for structured navigation in large bodies of information has been an issue for hypermedia research since Bush (1945) introduced the notion of Trails. In hypermedia research (Trigg, 1988) the trail concept is called guided tours and a number of systems have been implemented to support trails and guided tours also for the Web.

Among the systems supporting guided tours for the Web, are: Pooh's Guided Tours Service (www.infosys.tuwien.ac.at/GuidedTour/GuidedTour.html), Footsteps (Nicol et al., 1995), Walden's Paths (Furuta et al., 1997), and Ariadne (Jühne et al, 1998). All of these systems provide value-adding services for the WWW making it easier for the prospective users of the WWW to find their way through relevant information.
This paper presents a hypermedia based guided tour system for the WWW (Berners-Lee et al., 1992), which was developed as an integrated part of the open hypermedia system called Webvise(Grønbæk et al., 1999), which is now a commercial product called WebNize. The WebNize guided tours can be used by readers in plain browsers without using Java or any plug-in. The WebNize system is a full-blown open hypermedia system, with an integrated guided tour editor. WebNize generates guided tours in plain HTML and PNG formats for access through a plain browser.

The WebNize Guided Tour System is inspired from open hypermedia (Grønbæk & Trigg, 1999), classical hypertext (Trigg, 1988; Zellweger, 1989), and the recent Web initiatives mentioned. WebNize improves support for users in navigating through prepared presentations of subjects. In addition to inspiration from the classical hypertext systems we have been inspired from the ideas of simplified metro or bus maps to communicate information on routes in a complex city. This idea came across when our pilot users pointed to a handcrafted web page at Chalmers, Sweden (educate2.lib.chalmers.se/demopath.html). The WebNize system including the Guided Tour System as described in this paper is available from www.hypergenic.com.

The paper is organized as follows: First we describe the context in which WebNize has been brought into use for organizing learning materials. Secondly, we describe the how WebNize support the organization of learning materials. Then we describe experiences and results and finally we conclude the paper.

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2. Learning Resource Centre (LRC)

The Library at the Aarhus School of Business presents the results of co-operation between the Library and the Faculty of Modern Languages at the Business School. The purpose of this co-operation has been the development of a knowledge sharing platform and tools to facilitate knowledge sharing in a modern international environment of education and research at the Aarhus School of Business (Bang, 2001).
With the Library as the centre, the co-operation resulted in the establishment of a Learning Resource Centre (LRC) primarily aiming at servicing students, teachers, and researchers at the Faculty of Modern Languages.

The LRC has been established in close co-operation between the three environments: research, teaching and library. This co-operation has been prompted by an urgent need of initiating experiments with new forms of learning and education. Experience shows that new teaching methods generate quite new demands for developing new ways of giving students, teachers, and researchers access to quality-assessed information resources and to technology support. A modern research library must be capable of supporting the new learning environment with a wide selection of services matching the needs of the users.

Thus, the LRC has been organized as an "exploratorium" for students in new forms of learning and for training of teachers who are to act as facilitators in the virtual learning environment. The LRC centre both functions as a physical meeting place and as a place where electronic information resources and learning tools are available to the users via well-arranged and clear user interfaces accessible 24 hours a day.

2.1 Learning portal based on Metro maps

The Metro map metaphor has proved to be a suitable user interface for at learning portal for students and teachers in a LRC exploratorium. The Metro metaphor is fascinating, familiar to most people and easy to comprehend. It provides a general view, is useful for structuring a very large amount of web sites and it is next to impossible to get lost in. The METRO allows a graphically oriented user an easy navigation round the information and learning resources displayed in the show window of the electronic study of the LRC. All along you can follow a predefined search route for the drive of your journey from station to station on a key map. You can even get off and on as you like, without losing track of where you are.

The Library uses the metro map metaphor as a basis for constructing paths in the form of guided tours to the learning and information resources in the LRC (Jensen & Harbo, 2000). The Metro in the LRC at the Library of the Aarhus School of Business is based on the use of the open hypermedia system called WebNize.

2.2 New Learning Environments and Guided Tour Systems

In recent years the study and learning environments at the institutions of higher education in Denmark have changed. The frames earlier set by the traditional class- and lecture-room education do not suffice. The students still follow conventional lectures, but the responsibility for own learning is growing. To a large extent they work problem-based and project-orientated and need to meet in seminar rooms with facilities giving access to a wide range of quality-assessed information resources - electronic and printed – and user support tools side by side with teaching materials and learning tools. New and different physical and intellectual demands on facilitation of the study and working processes arise as a natural consequence of modern teaching methods. This only draws a picture of the facilities supporting the traditional daytime students at the universities and the institutions of higher education. Distance learners and part-time students have special needs.

Teachers and the research library only reach the students in these environments via an electronic user interface on the Internet. The support for studies and learning of such dimensions is a pedagogical challenge to institutions of higher education and to research libraries. The development of entirely new tools and methods for presenting library resources and guiding the students is necessary to ensure optimal use of information content.

At the LRC of the Business School we have chosen to use the Metro metaphor and the concept of 'Guided Tours' as the educational concept, which is to support user access to electronic information resources, to the learning content and to the tools supporting the learning process itself. The concept of 'Guided Tours' in the learning portal offers the opportunity of guiding the user via pre-defined routes in the shape of linear courses. The users may also choose to plan their own individual course based on their needs.

3. The WebNize hypermedia System

We believe that support for guided tours is needed in many application domains. Teachers, librarians, Web journalists, portal editors, publishers, governmental administration etc. often wish to present procedures or collections of information in a homogeneous manner.

Figure 1: The metro map generated from the guided tour editor

This is supported by the fact that the notion of a guided tour has become quite common on the Web. The search terms "guided tour" gave in December 2001 more than 550.000 hits on Google (www.google.com). Many of these hits actually represent sites that present a certain topic in a sequence of web pages and commented links like, e.g. the Visual Human (www.madsci.org/~lynn/VH), Wind Energy (www.windpower.dk/tour) and the Chalmers Library guide (educate2.lib.chalmers.se/demopath. html). The WebNize system has been designed to overcome problems and limitations of manually created guided tours and existing guided tour systems.

3.1 The metro map metaphor

As described in (Sandvad et al., 2001) the metro map has been used in WebNize, because:

- It is an intuitive metaphor – navigation resembles familiar ways of navigating metro and bus maps
- It creates an overview of a large complex of related guided tour modules – the Metro Map
- It maintains focus and overview for the user navigating a specific guided tour module – the Route Map

Usage of the metro map metaphor in guided tours has shown to be an efficient technique for providing overview over a set of web documents because the metaphor is intuitive and simple. Many people around the world know how to read route maps for metros or busses. Given the destination station it is easy to find which route to take even in large cities like Paris and London. Designing metro maps in the real world is, however, not a simple matter (Garland, 1994; Tufte, 1997), and it is not either simple on the Web, where we don't have a fixed underlying map of the structure to traverse similar to a city map. But we provide a general tool that allow map designers, i.e. the domain experts, a large degree of freedom in the design of simplified maps of arbitrary complex underlying structures.

The main idea in using the metro map metaphor in guided tours is to consider each major subject in the web information as a route in the metro map. When the reader wants to know something about a certain subject s/he just has to "take the metro" on the route that deals with that subject. If the reader is very unfamiliar with the subject s/he should start at the central metro station whereas more experienced readers can enter the metro farther out on the route (see Figure 1).

Hence, metro maps are used to provide overview when entering the information infrastructure by showing an overview over all routes. But the metro map metaphor has more to give. Inside the real metro wagons a horizontal route map is shown with all the stations on the route, and every time the metro stops at a station the traveller can see where s/he is on the route, which stations have already been visited, and which stations are yet to be visited (see Figure 2). This has inspired the presentation of a route map above the Web document as will be shown in the following.

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To take full advantage of the structure of the guided tour, the user should be able to view the relevant part of the tour while following a route. The user should be able to monitor the stations in the tour that have been visited and where the user is currently located within the tour. Finally, the author of a tour should help the user by adding names or/and annotation to the stations.

This is supported in the WebNize Guided Tour System. It helps users keep their orientation in the tour, e.g. if the user has lost orientation because s/he has gone off the tour by following links from a page in the tour, a quick look at the graphical presentation of the tour helps the user regain the focus. The annotation support gives the author the possibility to add comments about Web pages within the tour. This can be used in a variety of use situations, e.g. if the author wants to review the sites in the tour, draw the readers attention to a specific topic in the page or — in an educational situation — adding questions to the topics touched in the page.

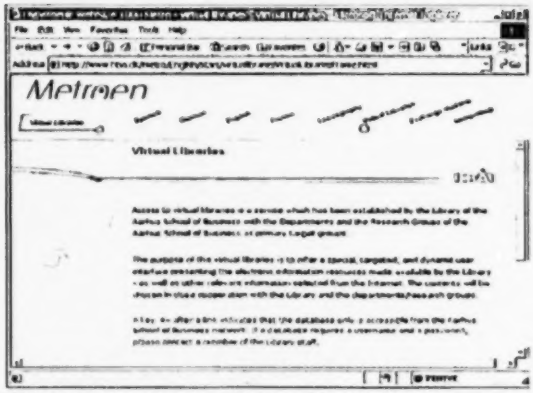

Figure 2: A route map generated by WebNize

4. Usage of WebNize generated tours

This section presents the metro map metaphor and shows an example of how it has been used in a user guidance system at the Library at the Aarhus School of Business. We present a metro map and one of the route maps that are generated from the WebNize guided tour editor. The generated metro and route maps can be visited at www.hba.dk/metro.

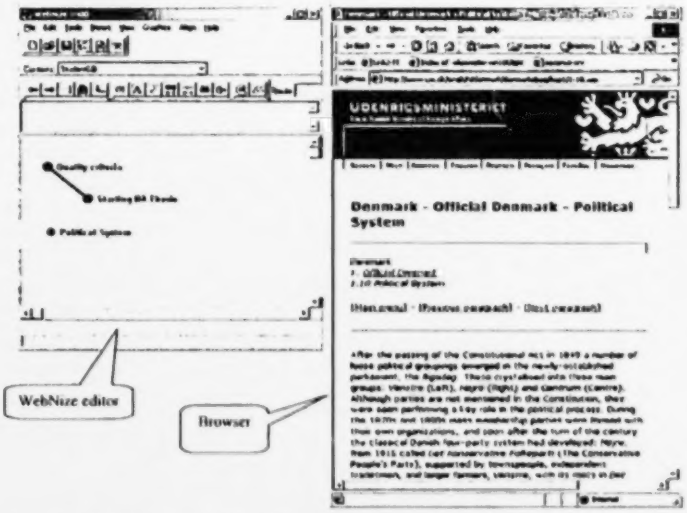

Figure 3: WebNize Metro Map Editor Interface

4.1 The generated metro and route maps

Figure 1 shows the metro map of the user guidance system. The different routes in the map present different recommended ways through the user guidance system. Each route represents a certain topic. The topics are: literature, library orientation, study guidance, project writing, Internet, vocabularies, writing laboratory, virtual libraries and information retrieval. If the user wants to follow the recommended sequence s/he just has to click on the oval figure of a route. Otherwise s/he can jump directly to a particular station by clicking on it. When clicking a station in the metro map, a route map is shown together with the contents of the parti-cular station. If the 'Virtual Libraries' station is clicked in the yellow route the frameset in Figure 2 is presented.

The frameset consists of two frames: a *navigation frame* and a *contents frame*. The navigation frame shows the selected route and the position on the route by red colouring of the current station. The contents frame shows the contents of the current station, i.e. the URL that the station represents. Each station can be selected directly by clicking on it, and the route map highlights the current station. The Metro and Route maps helps maintaining an overview of where the user is in a large body or related learning resources.

4.2 The user interface of the WebNize Guided Tour System

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The guided tour editor is a drawing editor (see Figure 3) that makes it possible to define the sequencing of stations in the guided tour in a general graph. Stations can be added to the graph in different ways. One way is adding a URL to the guided tour by using the command 'Add to guided tour' in an extended popup menu of the Internet Explorer. URLs (from the Address field and links in the web pages) can also be dragged into the guided tour editor. More facilities are described in details in (Sandvad et al., 2001)).

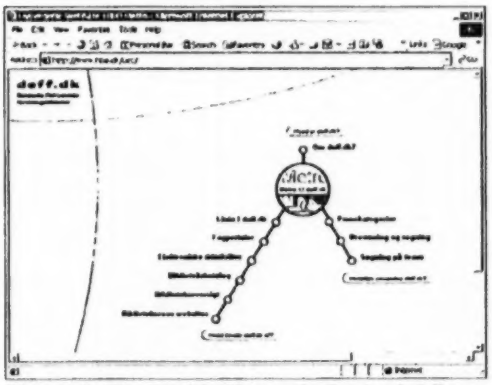

Figure 4: The Danish Electronic Research Library instruction Metro map running in the LRC.

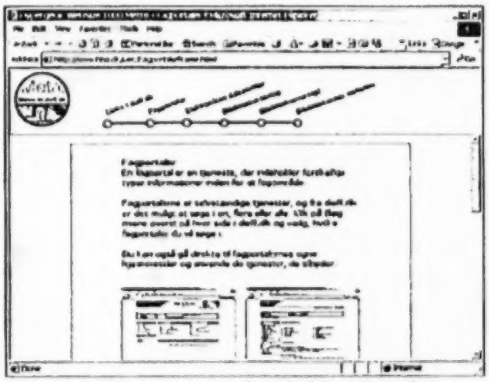

Figure 5: The route map for "Subject Portals"

5. Results and experiences

Till now, WebNize has been used as a developing platform for the Metro concept and to create Guided tours for the use of establishing learning platforms in the LRC exploratorium at the Business School. Feedback from students and teachers confirm that the concept presenting large amounts of information, courses and teaching material in a linear and transparent manner is valuable. This gives occasion for the further development and use of the concept in professional learning platforms of other Danish research libraries.

The Business School Library has recently made use of the WebNize tool in designing a portal for knowledge sharing for a cross-departmental research team working with e-Business (www.hba.dk/webnize100server/tours/e_business/index.htm). E-Business Forum is a platform for knowledge sharing across professional environments and frontiers, and it will develop into a dynamic site with researchers sharing their knowledge, commenting on research results, and automatically 'reap' information from databases.

The Business School Library has also utilized the Metro concept for experiments with user instruction for The Danish Electronic Research Library Project (DEF). Here the Guided Tours have been used for structuring the content of the DEF Project as search instructions for users (www.hba.dk/uec/) as well as Figure 4 and 5.

6. Conclusion and future work

This paper has described the WebNize guided tour system, which consists of an editor/viewer helper application and a generator to create a stand-alone guided tour website consisting of only HTML and PNG files, which can be used through plain browsers. The status of the WebNize guided tour system is that it is now a product, which is being developed and used for a number of portal projects on consulting basis by Hypergenic.

The Metro Map based guided tours have been in use at the Aarhus School of Business since September 2000 (www.hba.dk/metro). The guided tours have been used as basis for introducing all first year students to library use and information search. In addition the Metro Map is the start page on all PCs (70) in the Learning Resource Centre with 1250 students and 130 teachers. The response is very positive from the students as well from the teachers and the Aarhus School of Business are using to the approach in other domains beyond library introduction. A new route 'Courses' with a station for each course is currently being developed in collaboration with the teachers and the use of the system is by teachers as well as students expected to increase in the future.
To a larger extent the Metro Map is being used for structuring 'Virtual Libraries', that is, targeted vertical portals holding parts of the information resources of the research library, targeted at a department, a team of

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researchers, students or a company. Next step is developing the tool, thus enabling the user to download it and use it for creating personal learning platforms 'my courseware' or personal libraries 'my library'. In co-operation with Hypergenic A/S, the LRC is experimenting on the development of such facilities.

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